Remarks

The Office Action mailed 10 January 2006 has been received and reviewed. The pending claims are claims 45-74.

Reconsideration and withdrawal of the rejections, in view of the following comments, are respectfully requested.

The 35 U.S.C. §102 Rejection

The Examiner rejected claims 45-48 and 54-59 under 35 U.S.C. §102(e) as being anticipated by Komatsu (U.S. Patent No. 5,907,789). Applicants respectfully traverse this rejection.

It is well established that to sustain a rejection under 35 U.S.C. §102, a single prior art reference has to teach every element of the claimed invention. Applicants maintain the assertion provided in the Amendment and Response filed 26 October 2005 that Komatsu fails to teach every element of rejected claims 45-48 and 54-59. Therefore the rejection should be withdrawn.

For anticipation to occur, a prior art disclosure must put the public in possession of the invention:

> "In determining that quantum of prior art disclosure which is necessary to declare an applicant's invention 'not novel' or 'anticipated' within section 102, the stated test is whether a reference contains an 'enabling disclosure'... ." *In re Hoeksema*, 399 F.2d 269, 158 USPQ 596 (CCPA 1968). The disclosure in an assertedly anticipating reference must provide an enabling disclosure of the desired subject matter; ***mere naming or description of the subject matter is insufficient, if it cannot be produced without undue experimentation***. *Elan Pharm., Inc. v.* **>*Mayo Found. For Med. Educ. & Research*<, 346 F.3d 1051, 1054, 68 USPQ2d 1373, 1376 (Fed. Cir. 2003) . . . . A reference contains an "enabling disclosure" if the public was in possession of the claimed invention before the date of invention. "Such possession is effected if one of ordinary skill in the art could have combined the publication's description of the invention with his [or her] own knowledge to make the claimed invention." *In re Donohue*, 766 F.2d 531, 226 USPQ 619 (Fed. Cir. 1985).

M.P.E.P. §2121.01 (emphasis added). Applicants respectfully submit that Komatsu does not put the public in possession of the claimed invention as recited in claims 45-48 and 54-59, which recite a chemical vapor codeposited diffusion barrier layer, wherein the diffusion barrier layer is formed of $RuSi_x$. Applicants respectfully submit that at the time of the present invention, Komatsu would have failed to provide an enabling disclosure of a chemical vapor codeposited diffusion barrier layer formed of $RuSi_x$.

In response, the Examiner asserted that "[i]n column 22, lines 29-39, Komatsu clearly discloses that the metal silicide layer may be made of silicon and one of many metals including ruthenium. Because Komatsu states in the same paragraph the possible precursors for Ti, W, Mo, Ta, Pt, Re does not preclude the fact that Komatsu specifically states in the same paragraph that the metal silicide layer may comprise one of many metals including ruthenium" (present Office Action, mailed 10 January 2006, page 6, item 8, lines 5-10). Applicants earnestly disagree.

Applicants contend that the mere naming of ruthenium as "one of many metals" that may be used as a metal silicide layer is insufficient to provide an enabling disclosure such that the public was in possession of the claimed invention at the time of the present invention. Although the mere naming of a chemical vapor codeposited diffusion barrier layer formed of $RuSi_x$ might arguably provide an adequate written description for such a layer, such naming is clearly insufficient to enable the formation of a chemical vapor codeposited diffusion barrier layer formed of $RuSi_x$, for at least the following reasons.

A §102 reference "must sufficiently describe the claimed invention to have placed the public in possession of it. . . . "[E]ven if the claimed invention is disclosed in a printed publication, that disclosure will not suffice as prior art if it was not enabling" (*Paperless Accounting, Inc. v. Bay Area Rapid Transit System*, 804 F.2d 659, 665, 231 USPQ 649, 653 (Fed. Cir. 1986). Furthermore, "An enabling disclosure is not 'tossing out the mere germ of an idea' but the provision of 'reasonable detail . . .in order to enable members of the public to understand and carry out the invention.'"(*United States Filter Corp. v. Ionics, Inc.*, 53 USPQ2d, 1071, 1085 (D. Mass 1999), *quoting*, *Genentech, Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1366

(Fed. Cir), *cert. denied*, 522 U.S. 963 (1977)). Applicants assert that the suggestion in Komatsu of ruthenium as "one of many" possible silicides is merely a tossing out the mere germ of an idea, and is insufficient to provide an enabling disclosure to anticipate Applicants' invention.

In addition, "[t]he test of enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation." *United States v. Telectronics, Inc.*, 857 F.2d 778, 785, 8 USPQ2d 1217, 1223 (Fed. Cir. 1988) (*citing*, *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384, 231 USPQ 81, 94 (Fed. Cir. 1986). *See also*, M.P.E.P. §2161.04. Factors to be considered when determining whether any necessary experimentation is "undue" include the following (the "Wands factors"):

(A) The breadth of the claims;
(B) The nature of the invention;
(C) The state of the prior art;
(D) The level of one of ordinary skill;
(E) The level of predictability in the art;
(F) The amount of direction provided by the inventor;
(G) The existence of working examples; and
(H) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.

In re Wands, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988); M.P.E.P. §2164.01(a). Applicants assert that Komatsu, taken as a whole and in view of the above factors, does not enable Applicants' claimed invention including a diffusion barrier layer formed of $RuSi_x$.

For example, Komatsu specifically discloses in the Object and Summary of the Invention the provision of "tungsten silicide (WSi_x) formed by CVD" (e.g., column 4, line 43; column 4, line 58 to column 5, line 6; column 5, line 66 to column 6, line 6; and column 6, lines 19-22). In addition, the Summary also suggests that "the metal silicide layer may comprise titanium silicide, tungsten silicide, molybdenium silicide, or tantalum silicide" (col. 5 line 67 to col. 6, line 2, and col. 6, lines 19-22). Furthermore, of the seven exemplary process embodiments disclosed in the Detailed Description of the Preferred Embodiments, at column 9, line 40 to column 22, line 14, each of the embodiments that teach formation of a metal silicide layer

specifically teach a tungsten silicide layer (col. 8, lines 41-42; col. 10, lines 38-39; col. 11, lines 24-25; col. 17, line 57; col. 19, lines 24-25, and line 60; and col. 8-10 and lines 30-31) or a titanium silicide layer (col. 18, lines 57-61), as well as conditions for forming these layers. Further, other specific silicides suggested for use in "forming a thin film or island-like region for a gate electrode may include a refractory metal silicide such as $MoSi_x$, $TiSi_x$, or $TaSi_x$" (col. 16, lines 21-23). Thus, Komatsu provides direction and working examples that might arguably provide enablement for deposition of tungsten silicide and titanium silicide layers. Komatsu may also arguably provide direction for use of $MoSi_x$, $TiSi_x$, or $TaSi_x$ for forming a thin film or island-like region. Applicants assert, however, Komatsu fails to enable chemical vapor codeposition of a diffusion barrier layer formed of $RuSi_x$.

Komatsu fails to clearly and unambiguously disclose a chemical vapor codeposited diffusion barrier layer formed of $RuSi_x$, as recited in Applicants' claims. Komatsu merely suggests that "in place of the metal silicide layer made of WSi_x, there may be used a metal silicide layer made of silicon and a metal such as titanium (Ti), molybdenium (Mo), tantalum (Ta), vanadium (V), chromium (Cr), cobalt (Co), nickel (Ni), zirconium (Zr), niobium (Nb), rhodium (Rh), palladium (Pd), hafnium (Hf), platinum (Pt), manganese (Mn), iron (Fe), iridium (Ir), ruthenium (Ru), osmium (Os), or rhenium (Re)" (col. 22, lines 29-37). Even if Komatsu could arguably be interpreted as naming a ruthenium silicide layer based on the suggestion of a metal silicide layer made of silicon and any one of 19 possible metals, one of which is ruthenium, Applicants respectfully submit that the mere naming of the possibility of a ruthenium silicide layer by Komatsu fails to provide the enablement necessary for Komatsu to anticipate the present claims.

In addition, Komatsu suggests that a metal silicide layer may be formed by sputtering, deposition or CVD (col. 22, lines 32-39). Komatsu, however, neither suggests nor discloses precursor compositions (e.g., ruthenium complexes and optional solvents), chemical vapor deposition systems, or conditions required for chemical vapor codeposition of a diffusion barrier layer formed of $RuSi_x$. Further, the Examiner has provided no evidence that chemical vapor codeposition of $RuSi_x$ or that ruthenium precursors for chemical vapor codeposition were known

in the art at the time of the present invention. Applicants, therefore, submit that the Examiner has failed to present a convincing argument to show how Komatsu, at the time the present invention was made, would have enabled the skilled person to form a $RuSi_x$ diffusion barrier layer by chemical vapor codeposition.

Applicants assert, for at least the above reasons, that the disclosure of Komatsu, taken as a whole, does not enable the chemical vapor codeposited diffusion barrier layer formed of $RuSi_x$ according to Applicants' claims. Thus, Applicants respectfully submit that Komatsu fails to anticipate present claims 45-48 and 54-59. Reconsideration and withdrawal of the rejection of claims 45-48 and 54-59 as being anticipated by Komatsu are respectfully requested.

The 35 U.S.C. §103 Rejections

The Examiner rejected claims 45, 46, 50, 51, 57-59, and 63-65 under 35 U.S.C. §102(e) as being anticipated by Kuroiwa et al. (U.S. Patent No. 6,239,460) in view of Agostinelli et al. (U.S. Patent No. 5,017,551). As an initial matter, in view of the text of the rejection and the fact that it is positioned in the present Office Action, mailed 10 January 2006, under the heading "***Claim Rejections - 35 USC § 103***," Applicants are under the assumption that the Examiner intended to indicate that the above claims were rejected under **35 U.S.C. §103(a)** as being **unpatentable over** Kuroiwa et al. in view of Agostinelli et al. Clarification is respectfully requested. Nonetheless, under the above assumption, Applicants respectfully traverse this rejection.

In order to establish a *prima facie* case of obviousness, the Examiner must establish that there is a motivation to combine the documents (or modify the teachings of a document) to achieve the claimed invention, with a reasonable expectation of success. Further, the references must teach or suggest every element of the claimed invention. For at least the reasons set forth below, it is respectfully submitted that the Examiner has failed to make the requisite showing of a *prima facie* case of obviousness of claims 45, 46, 50, 51, 57-59, and 63-65 over Kuroiwa et al. in view of Agostinelli et al.

Applicants note the Examiner's admission that "Kuroiwa does not disclose at least one of the first and second electrode comprising a chemical vapor diffusion barrier layer" (Office Action issued 10 January 2006, page 3, item 4, lines 6-7). Applicants disagree, however, with the Examiner's position that Agostinelli et al. provide that which is missing from Kuroiwa with respect to Applicants' claims 45, 46, 50, 51, 57-59, and 63-65.

Agostinelli et al. teach a circuit element comprised of a substrate, an electrically conductive layer on the substrate comprised of a crystalline rare earth alkaline earth copper oxide, and an interposing barrier layer (Agostinelli et al., abstract). "The barrier layer contains magnesium, a group IVA metal, or a platinum group metal, either in an elemental state or in the form of an oxide or silicide" (Agostinelli et al., abstract). The platinum group metal may include ruthenium (Agostinelli et al., col. 4, lines 31-32). Applicants submit, however, that Agostinelli et al. fail to provide an enabling disclosure of a chemical vapor codeposited diffusion barrier layer formed of $RuSi_x$.

The Examiner stated that "*Komatsu* also discloses (see, for example, column 20, lines 11-16) that various convenient methods can be used to form the metal silicide such as chemical vapor deposition procedures." (Office Action issued 10 January 2006, page 3, item 4, lines 8-10, emphasis added). Applicants respectfully point out, however, that this rejection is not based on the disclosure of Komatsu; it is based on Kuroiwa in view of *Agostinelli et al.* Applicants are unclear as to why the Examiner referred to Komatsu. Clarification is respectfully requested in the next Official Action to provide Applicants with the opportunity to prepare an appropriate response.

Notwithstanding the above comments, and for the purposes of preparing a response to the rejection made herein, Applicants hereby address the present rejection as if the Examiner intended to state that "Agostinelli et al. [not Komatsu] also discloses . . . that various, convenient methods can be used to form the metal silicide such as chemical vapor deposition procedures." Applicants respectfully submit that Agostinelli et al. fail to enable a chemical vapor codeposted diffusion barrier layer formed of $RuSi_x$, for reasons similar to those provided above in connection with Applicants' response to the rejection of the claims as anticipated by Komatsu.

Applicants assert that, in view of the disclosure of Agostinelli et al. taken as a whole, neither a chemical vapor codeposited diffusion barrier layer formed of $RuSi_x$, nor any chemical vapor codeposited diffusion barrier layer are enabled.

For example, although Agostinelli et al. may disclose a ruthenium oxide barrier layer (e.g., "[t]he barrier layer contains a metal, in its elemental form, or in the form of an oxide or silicide, chosen from the group consisting of magnesium, a group IVA metal and a platinum group metal" (col. 4, lines 21-24), and "[t]he term 'platinum group metal' refers to a metal from the second and third triads of Group VIIIA of the periodic table – i.e., ruthenium, rhodium, or palladium forming the second triad or osmium, iridium, or platinum forming the third triad" (col. 4, lines 28-32)), this disclosure merely suggests a ruthenium silicide barrier layer. Applicants assert, in view of the entire teachings of Agostinelli et al., that insufficient direction is provided to enable a chemical vapor codeposited ruthenium silicide barrier layer.

Further, there are no working examples of a barrier layer formed of ruthenium silicide. Of the fifteen examples provided by Agostinelli et al., only Examples 9, 11, and 13 disclose the provision of a metal silicide barrier layer. Furthermore, in each of these instances the barrier layer is a mixture of the metal silicide and the metal oxide formed by the provision of the elemental metal deposited on a silicon substrate and heated to 1000°C in oxygen. It is further pointed out that the exemplified metal silicides are zirconium silicide (Examples 9 and 11) and magnesium silicide, and also that none of the working examples use ruthenium of any form (e.g., elemental, oxide, or silicide) in the barrier layers.

Additionally, with respect to the formation of the barrier layer, Agostinelli et al. teach, at column 19, lines 24-28, that the barrier layers "can be formed starting with barrier precursors, barrier metal-ligand compounds, where the ligands are chosen in the same manner as described in connection with RAC precursors" (e.g., coating the substrate with precursors including at least one thermally volatilizable ligand, then heating to remove the volatilizable ligand, col. 5, lines 5-22). Alternatively, "[a] preferred approach for forming elemental barrier layers is to deposit the metal on the substrate by conventional electron beam techniques," then "[i]n subsequent heating

. . . the barrier metal can, if desired, be converted to the corresponding oxide or silicide" (col. 19, lines 49-55).

Thus, Agostinelli et al. provide a detailed description of the process for providing amorphous layers of the rare earth-alkaline earth-copper (RAC) compositions, which process (e.g., thermal decomposition) was specifically identified as useful for providing the barrier layer (col. 19, lines 24-28) and disclosed in the working examples (e.g., Example 1, col. 20, lines 24-29). Agostinelli et al. also provide direction, as well as working examples (e.g., Example 9, col. 22, lines 53-59), to form a barrier layer by depositing an elemental metal layer by conventional electron beam techniques and, subsequently, convert the elemental layer to the corresponding oxide or silicide. Applicants assert, however, that the brief suggestion provided at the end of the Description of Preferred Embodiments that "the barrier layer can alternatively be formed by any other convenient conventional preparation process" such as "sputtering, vacuum vapor deposition, and metal-organic chemical vapor deposition procedures (col. 20, lines 11-16), fails to provide direction to the skilled person, in view of the entire disclosure of Agostinelli et al., to enable a chemical vapor codeposited diffusion barrier layer formed of $RuSi_x$.

Specifically, Agostinelli et al. fail to clearly and unambiguously disclose a chemical vapor codeposited barrier layer formed of $RuSi_x$ as recited in the present claims. Moreover, even if Agostinelli et al. could arguably be interpreted as naming a chemical vapor codeposited barrier layer (Agostinelli et al., col. 20, lines 11-16) which may include ruthenium in the form of a silicide (Agostinelli et al., abstract), Applicants respectfully submit that the mere naming of a chemical vapor codeposited barrier layer by Agostinelli et al. fails to provide the enablement necessary for Agostinelli et al. to render the present claims obvious.

Further, Agsotinelli et al. fail to provide any disclosure or suggestion of precursor compositions (e.g., including ruthenium complexes and optional solvents), vapor codeposition systems, and conditions required for the chemical vapor codeposition of a diffusion barrier layer formed of $RuSi_x$. In addition, the Examiner has provided no evidence that chemical vapor codeposition of $RuSi_x$ was known in the art at the time of the present invention, and, further, that ruthenium precursors for chemical vapor codeposition where known in the art at the time of the

present invention. Thus, Applicants respectfully submit that the Examiner has failed to present a convincing line of reasoning as to how Agostinelli et al., at the time the present invention was made, would have enabled one of skill in the art to form a $RuSi_x$ diffusion barrier layer by chemical vapor codeposition.

In summary, Applicants point out that Agostinelli et al. states that "[i]t is the discovery of this invention that specifically selected metals as well as their oxides and silicides when interposed between a substrate . . . and the RAC layer enhances the electrical conduction properties of the RAC layer" (col. 18, lines 38-43). Applicants further assert that, in view of the foregoing comments and considering the disclosure of Agostinelli et al. as a whole, there are no examples of forming a $RuSi_x$ barrier layer by chemical vapor codeposition, there is no specific direction provided to select ruthenium silicide as a barrier layer, nor is there enablement for chemical vapor codeposition of any barrier layer. The Examiner asserted that, in view of Agostinelli et al., "it would have been obvious to one of ordinary skill in the art at the time of invention to have at least one of the first and second electrode comprising a chemical vapor diffusion barrier layer," (page 3, item 4, lines 10-12 of the present Office Action, mailed 10 January 2006). However, no evidence is provided to show that the level of one of ordinary skill and/or the state and predictability of the art at the time of filing was such that Agostinelli et al. provide an enabling disclosure of a chemical vapor codeposited diffusion barrier layer formed of $RuSi_x$, according to Applicants' claims. As this teaching is not enabled, Agostinelli et al. fail to provide that which is missing from Kuroiwa.

With respect to dependent claims 58-59 and 64-65, the Examiner asserted that "Kuroiwa discloses the ruthenium silicide layer within an opening of the insulating film 110" (at page 4, lines 1-2 of the present Office Action, mailed 10 January 2006). Applicants disagree, respectfully pointing out that claims 58-59 and 64-65 recite a structure "wherein the diffusion barrier layer comprises a conformal layer within the opening" (claims 58 and 64) wherein the layer may be of uniform thickness (claims 59 and 65). Kuroiwa et al., on the other hand, teach a plug 111 in the contact hole 110a wherein the plug 111 may be silicon or a metal, and "the metal electrode 130 is, as shown in FIG. 6, ***deposited on the top surface of the of the plug 111 and the***

surface of the first interlayer insulating film 110." (Kuroiwa et al., col. 12, lines 26-28, emphasis added). Thus, Kuroiwa et al. fail to teach or suggest a diffusion barrier layer comprising a conformal layer within the opening according to Applicants' claims 58-59 and 64-65. Furthermore, Agostinelli et al. fail to teach or suggest the openings according to Applicants' claims. Thus, claims 58-59 and 64-65 are nonobvious over the combination of Kuroiwa et al. and Agostinelli et al.

Thus, for at least the above reasons, Applicants assert that independent claims 45, 50, 57, and 63, and dependent claims 58-59 and 64-65 are nonobvious over the combination of Kuroiwa et al. and Agostinelli et al. Also, for at least the reason that claim 46 is dependent on claim 45, that claim 51 is dependent on claim 50, that claims 58-59 are dependent on claim 57, and that claims 64-65 are dependent on claim 53, these claims are also nonobvious over the combination of Kuroiwa et al. and Agostinelli et al.

Reconsideration and withdrawal of the above rejection of claims 45, 46, 50, 51, 57-59, and 63-65 are respectfully requested.

The Examiner rejected claims 48, 49, 54, 55 and 69-74 under 35 U.S.C. §103(a) as being unpatentable over Kuroiwa et al. (U.S. Patent No. 6,239,460) in view of Agostinelli et al. (U.S. Patent No. 5,017,551) as applied to claims 45, 46, 50, 51, 57-59, and 63-65, and further in view of Lee et al. (U.S. Patent No. 5,872,041, hereinafter "Lee '041")). Applicants respectfully traverse this rejection.

Applicants respectfully submit that the cited documents do not teach or suggest all of the language recited in the present claims. Specifically, the combination of Kuroiwa et al. and Agostinelli et al., which has been discussed hereinabove, lacks, among other things, a chemical vapor codeposited $RuSi_x$ diffusion barrier layer. Applicants respectfully submit that Lee '041, which "relates to a method for fabricating the electrodes of a semiconductor capacitor" (column 1, lines 8-9), fail to cure the deficiencies of the combination of Kuroiwa et al. and Agostinelli et al. Thus, for at least this reason, Applicants respectfully submit that claims 48, 49, 54, 55, and

69-74 are patentable over Kuroiwa et al. in view of Agostinelli et al. and further in view of Lee '041.

Moreover, Applicants note that the Examiner stated that "Kuroiwa in view of Agostinelli does not disclose a silicon containing region" (page 4, item 5, lines 3-4 of the present Office Action, mailed 10 January 2006). Applicants do not understand this statement, as Kuroiwa et al. clearly disclose the deposition of ruthenium on a silicon containing surface (e.g., column 10, lines 48-49, reciting that "plug 111 was made of polycrystal silicon containing doped phosphorus"). Further, Kuroiwa et al. disclose that the deposition of ruthenium is followed by heat treatment to form a ruthenium silicide layer through a salicidation process. Thus, a silicon containing surface is not only disclosed by Kuroiwa et al.; Kuroiwa's disclosed ***salicidation process*** to form a ruthenium silicide layer actually ***requires*** a silicon containing surface.

In contrast, claims 69-74 recite that "the surface defining the opening is not a silicon containing surface." In view of the remarks presented herein above, Applicants respectfully submit that any suggestion by the Examiner to modify the teachings of Kuroiwa et al. in view of Agostinelli et al. to form a ruthenium silicide layer on a surface defining an opening that is not a silicon containing surface would impermissibly render the teaching of Kuroiwa et al. inoperative. *See, for example*, M.P.E.P. 2143.01, which states that "[i]f proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." Thus, for at least these reasons, Applicants respectfully submit that claims 69-74 are patentable over Kuroiwa et al. in view of Lee '041.

Thus, for at least the reasons presented herein above, Applicants respectfully submit that claims 48, 49, 54, 55, 69-74 are not *prima facie* obvious under 35 U.S.C. §103 over Kuroiwa et al. in view of Agostinelli et al., and further in view of Lee '041. Reconsideration and withdrawal of the rejection under 35 U.S.C. §103 are, therefore, respectfully requested.

The Examiner rejected claims 52 and 53 under 35 U.S.C. §103(a) as being unpatentable over Kuroiwa et al. (U.S. Patent No. 6,239,460) in view of Agostinelli et al. (U.S. Patent No.

5,017,551) and further in view of Lee et al. (U.S. Patent No. 5,872,041, Lee ('041)) as applied to claims 48, 49, 54, 55, and 69-74, and further in view of Matsubara et al. (U.S. Patent No. 5,122,923). Applicants respectfully traverse this rejection.

Specifically, in the present case, the deficiencies of Kuroiwa et al. in view of Agostinelli et al. and further in view of Lee et al. '041 have been discussed hereinabove. In brief, none of Kuroiwa et al., Agostinelli et al., and/or Lee '041 disclose or suggest a chemical vapor codeposited $RuSi_x$ diffusion barrier layer. Moreover, Applicants respectfully submit that Matsubara et al., also fail to disclose or suggest a chemical vapor codeposited $RuSi_x$ diffusion barrier layer. Thus, Applicants respectfully submit that claims 52 and 53 are patentable over Kuroiwa et al. in view of Lee et al. '041, and further in view of Matsubara et al.

Applicants note that the Examiner stated that "Kuroiwa in view of Agostinelli in view of Lee does not disclose the first electrode comprising one or more additional conductive layers. However it was well known in the art at the time of invention to use multiple layers in the electrodes of a capacitor" and that "Matsubara discloses a lower electrode comprising multiple layers of ruthenium, ruthenium oxide, ruthenium silicide and stacked structures consisting of these materials. It would have been obvious to one of ordinary skill in the art at the time of invention to have the first electrode comprising one or more additional conductive layers in order to form an adequate bottom electrode, and since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art." (The present Office Action, mailed 10 January 2006, page 5, item 6, lines 4-12).

It is unclear how the disclosure in Matsubara et al. regarding "[l]ayers of ruthenium, ruthenium oxide, ruthenium silicide and stacked structures consisting of these materials" (col. 4, lines 25-27) in connection with the Examiner's foregoing statements would suggest to one skilled in the art Applicants' capacitor structure according to claims 52 and 53, wherein "the first electrode comprises a diffusion barrier layer, wherein the diffusion barrier layer of the first electrode is formed on at least a portion of a silicon containing region, and further wherein the first electrode comprises one or more additional conductive layers formed over the diffusion barrier layer, the one or more additional conductive layers formed of at least one of a metal and a

conductive metal oxide." Nonetheless, the combination of Kuroiwa et al., Agostinelli et al., Lee '041, and Matsubara et al. still fail to teach a chemical vapor codeposited diffusion barrier layer formed of $RuSi_x$, as recited in Applicants' claim 52.

In order to establish a *prima facie* case of obviousness, the references must teach or suggest all the claim limitations. *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 U.S.P.Q. 81 at 93 ("Focusing on the obviousness of substitutions and differences instead of on the invention as a whole, . . . was a legally improper way to simplify the difficult determination of obviousness."). One cannot "simply [to] engage in a hindsight reconstruction of the claimed invention, using the Applicant's structure as a template and selecting elements from references to fill the gaps." *In re Gorman*, 933 F2d 982, 18 U.S.P.Q.2d 1885, 1888 (Fed. Cir. 1991). Further, both the suggestion for combining the teachings of the prior art to make the invention and the reasonable likelihood of its success must be founded in the prior art and not in the teachings of Applicants' disclosure. *In re Dow Chem.*, 837 F.2d 469, 473, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988). Here, the cited art neither suggests the combination of its teachings nor suggests the reasonable likelihood that such a combination would result in the present invention.

Furthermore, as recently reasserted in *Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.* (Fed. Cir., No. 04-1493, June 9, 2005), 35 U.S.C. §103 specifically requires an assessment of the claimed invention "as a whole." This "as a whole" assessment of the invention requires a showing that an artisan of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would have selected the various elements from the cited references and combined them in the claimed manner. In other words, 35 U.S.C. §103 requires some suggestion or motivation, before the invention itself, to make the new combination. See *In re Rouffet*, 149 F.3d 1350, 1355-56 (Fed. Cir. 1998).

This "as a whole" instruction in 35 U.S. §103 prevents evaluation of the invention part by part. Without this important requirement, an obviousness assessment might successfully break an invention into its component parts, then find a reference corresponding to each component.

This line of reasoning would import hindsight into the obviousness determination by using the invention as a roadmap to find its prior art components. Further, this improper method would discount the value of combining various existing features or principles in a new way to achieve a new result - often the essence of invention. *Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 1275 (Fed. Cir. 2004). Simply identifying the various elements of a claim in the cited references does not render a claim obvious. *Ruiz*, 357 F.3d at 1275. Instead, 35 U.S. §103 requires some suggestion or motivation in the prior art to make the new combination. *Rouffet*, 149 F.3d at 1355-56. Applicants submit that the Examiner has engaged in an improper part by part analysis of the claimed invention.

Thus, for at least the reasons presented herein above, Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness of claims 52 and 53 under 35 U.S.C. §103. Reconsideration and withdrawal of the foregoing rejection of claims 52 and 53 under 35 U.S.C. §103 are respectfully requested.

The Examiner rejected claims 60-62 and 66-68 under 35 U.S.C. §103(a) as being unpatentable over Kuroiwa et al. (U.S. Patent No. 6,239,460) in view of Agostinelli et al. (U.S. Patent No. 5,017,551) as applied to claims 45, 46, 50, 51, 57-59, and 63-65, and further in view of Lee et al. (U.S. Patent No. 5,897,350, herein after "Lee '350"). Applicants respectfully traverse this rejection.

The deficiencies of Kuroiwa et al. in view of Agostinelli et al. have been discussed hereinabove. Neither Kuroiwa et al. nor Agostinelli et al. disclose or suggest a chemical vapor codeposited $RuSi_x$ diffusion barrier layer. Further, Lee '350, which "relates to a memory cell structure of of (*sic*) semiconductor memory device" (col. 1, lines 6-7), also fails to disclose or suggest a chemical vapor codeposited $RuSi_x$ diffusion barrier layer, recited in independent claims 60 and 66.

Thus, for at least the above reasons, Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness of claims 60 and 66 under 35 U.S.C. §103.

Consequently, for at least this reason, claims 61 and 62, dependent from claim 60, and claims 67 and 68, dependent on claim 66 are also *prima facie* nonobvious.

Reconsideration and withdrawal of the above rejection of claims 60-62 and 66-68 under 35 U.S.C. §103 are respectfully requested.

Summary

It is respectfully submitted that all the pending claims are in condition for allowance and notification to that effect is respectfully requested.

The Examiner is invited to contact Applicants' Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

Respectfully submitted
By
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CERTIFICATE UNDER 37 CFR §1.8:
The undersigned hereby certifies that the Transmittal Letter and the paper(s), as described hereinabove, are being transmitted by facsimile in accordance with 37 CFR §1.6(d) to the Patent and Trademark Office, addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 10th day of May, 2006, at 2:52 PM (Central Time).

By: _____
Name: Sara E. Wigant